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The effect of perceptual-motor training on the perceptual-motor skills of emotionally disturbed children.

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Title: The Effects of Perceptual-Motor Training on the Perceptual-Motor Skills of Emotionally Disturbed Children.

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A study was conducted to determine if the program of perceptual-motor training outlined by D.H. Radler and Newell C. Kephart in their book, Success Through Play, would increase the perceptual-motor skills of emotionally disturbed children as measured by the Purdue Perceptual Motor Survey. Twenty children from the Portland, Oregon metropolitan area whose ages ranged from six to twelve years were included in the program. These children were grouped according to their diagnosis of withdrawn or acting-out which was received by the agency upon their referral. Three agencies participated in the study.

Each child was administered the Purdue Perceptual Motor Survey before any treatment was begun and their scores were recorded on a summary sheet for comparison with the scores which they would obtain when they were re-tested after the experiment was completed. Then for the next nine weeks, three days a week and one half hour a day, the subjects in the experimental group received the training outlined in Success Through Play and the subjects in the control group received quiet or physical activity for an equal amount of time. At the end of nine weeks, each child was again administered the Purdue Perceptual Motor Survey and the score was recorded.

The correlation of these pre- and post-test scores showed that the subjects in the experimental acting-out group improved their perceptual-motor skills significantly more than the control acting-out group; and the experimental withdrawn group improved their perceptual-motor skills significantly more than the control withdrawn group.

THE EFFECTS OF PERCEPTUAL-MOTOR TRAINING ON THE PERCEPTUAL-MOTOR SKILLS OF EMOTIONALLY DISTURBED CHILDREN

by

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CHAPTER I

INTRODUCTION

Man has created a complex society in which complicated behaviors are demanded in order to adjust to living in that society. Plasticity and variability are unspoken requirements for man to adjust to modern life. Individual plasticity requires increased learning and places more complicated and intricate demands upon primary skills which form the foundation of all behavior. A child is expected at a tender age to possess the inherent ability to modify his behavior in keeping with environmental influences and to adapt swiftly to a world of ever-increasing change.[1]

With the increase of complexity in our society, we have also increased the variability of our social organization. Our society manifests many contradictions with their corresponding involved responses and a child is pressed into keeping time with the society in which he finds himself. We allow few deviations in our demands that he learn to respond or have the ability to deal with our social structure on the terms with which we ourselves are

[1]Kephart, Newell C., The Slow Learner in the Classroom, Charles E. Merrill Books, Inc., Ohio, 1960, p. 14.

only somewhat able to cope. These responses, which we require of all children, are dependent upon the very basic skills which provide that a child be conditioned to correlate these skills with higher, more tangible objects and ideals. The gathering of basic abilities combined with later associated reactions enables all children to establish a basis for contact with each other, which is the primary ingredient of communication and conformity in later life.[2]

Unfortunately, many children experience difficulty in acquiring the social skills and adjustments rapidly enough to meet the expectations of their environment. Consequently, there exists a significant number of children in our society who are handicapped by emotional disturbances. According to some national authorities, at least 10 percent of our school-age population needs psychiatric help.[3] In recognition of this problem, there is currently a strong movement in our country to develop educational programs for emotionally disturbed children. One current trend within various programs serving the emotionally disturbed, in the attempt to rectify this type of learning problem, has been the recognition of perceptual-motor training as an important

[2]Ibid., p. 15.

[3]Dunn, Lloyd, ed., The Exceptional Child in the Schools, Holt, Rinehart, and Winston, New York, 1963, p. 243.

aspect of an intervention curriculum.[4]

It should be noted that perceptual-motor development is currently recognized as a vital part of child development by many educators in this country. Recent research has explored perceptual-motor learning as a means of establishing an understanding of a child's total development.

An individual's internal and external communication processes are in effect at birth. These input-output modalities can be categorized into the area of perceptual-motor development. Ophthamologists have recently become involved in much work with visual perception in relationship to scholastic deficiencies, especially reading. The motor cortex as a center of motor learning has been studied by both psychologists and educators. The importance of motor behavior, including that of visual perception, has been stressed in studies by Jean Ayers, Carl Delacato, Marianne Frostig, and Newell Kephart.[5]

Of the above authors, Kephart is one of the foremost researchers in perceptual-motor development. He places considerable emphasis on early motor learning and on the development of learning patterns, rather than on specific motor skills, as a necessary developmental foundation for

[4]Jacobson, Virginia, "Movement Experiences and Learning: A Motor Development Program for Young Children", Claremont Reading Conference, Claremont Graduate School Curriculum Laboratory, Claremont, California, 1966, p. 128.

[5]Ibid.

all children. He contends:

> It would seem possible to view development in the child, not so much as a sequence of acquisition of specific skills and performances, but as the sequential development of certain basic generalizations.[6]

The first responses in a newborn infant are motor responses. These early responses represent the beginnings of a long process of learning and development, and they become the foundation upon which subsequent learning is built. It is to be expected, therefore, that the first generalizations which a child learns are based on motor patterns. Because of this early learning, the motor system has developed a certain body of information before the perceptual system begins its development.

> Through this combined motor and perceptual-motor exploration, perceptual data are matched to motor data so that perceptual information and motor information become the same...It is essential that such matching take place.[7]

Kephart also views perceptual-motor development in all children as comprising six sequential stages.

> Six general categories are recognized in sequential order: 1) A Gross-Motor Stage; 2) A Motor-Perceptual Stage; 3) A Perceptual-Motor Stage; 4) A Perceptual Stage; 5) A Perceptual-Conceptual Stage; 6) A Conceptual Stage. The order of the stages is more important than when each occurs. They are hierarchical, building upon themselves in a related series, although it is recognized that there is some overlapping. Perceptual-motor learning is incomplete if the child's gross-motor learning has been distorted. Likewise, conceptual

[6]Kephart, Newell C., The Brain Injured Child in the Classroom, National Society for Crippled Children and Adults, inc., Chicago, Illinois, 1963, p. 1.

[7]Ibid., p. 10.

> learning is hindered if areas of gross-motor and perceptual-motor learning have been omitted.[8]

He believes, in turn, that specific movements develop out of a generalized pattern of differentiation known as the cephalo-caudal and proximo-distal trends. This means that the head-trunk region develops before the lower limbs and that large muscle groups nearer the center of the body develop before muscles near the extremities; hence, the gross motor skills are developed before the fine motor skills. A child must also be able to differentiate between his right and left sides and be able to control both, either simultaneously or separately. The ability to balance is the primary requirement for achieving this inner differentiation. Also, a child's 'body image' and his kinesthetic awareness of where he is in space and the relationship of himself to other objects must be developed. All stimuli are vital in achieving awareness and understanding of these concepts.

With emotionally disturbed children, it may be suspected that in many ways their emotional disturbances may have 'pre-empted' their natural learning of certain gross-motor abilities and one or more of the stages which Kephart sets forth may have been actually omitted from their development. This seems to indicate the distinct possibility of a deficit in development which could possibly be overcome with proper

[8]Ebersole, Marylou, Kephart, Newell C., and Ebersole, James B., Steps to Achievement for the Slow Learner, Merrill Publishing Co., Ohio, 1968, p. 65.

training, giving even the emotionally disturbed child a complete background of perceptual and motor development with which to progress through life. Kephart states that "when the learning interference begins at an early age, certain developmental skills will not be achieved or will be learned inadequately."[9] Therefore, it seems that the child may find learning in the classroom difficult or impossible due to the disruption of later developing skills. Herbert Grossman explains it this way:

> Students with emotional problems often have difficulties in school because they may behave in ways which limit their educational achievement in order to assuage their disturbing emotions.[10]

In addition, Kephart feels that there are two kinds of emotional disturbances in children.

> The first of these is the traumatic disturbance in which the child encounters an incident which is so highly charged emotionally that his behavior is disrupted... In the school situation such traumatic emotional disturbances require emotional support in the classroom situation coupled with psychotherapy or similar techniques to relieve the distress...A second type of emotional disturbance results from experiences which are less highly charged emotionally but are extended over time.[11]

The largest amount of research to verify the effectiveness of perceptual-motor training on learning has been done with mentally retarded children. However, perceptual-motor

[9]Kephart, Newell C., Learning Disability: An Educational Adventure, Kappa Delta Pi Press, West Lafayette, Indiana, 1968, p. 12.

[10]Grossman, Herbert, Teaching the Emotionally Disturbed, Holt, Rinehart and Winston, Inc., New York, 1965, p. 22.

[11]Kephart, Newell C., Learning Disability: An Educational Adventure, op. cit., p. 81.

training programs are also widely employed for all learners in the public schools as well as treatment centers for the emotionally disturbed.

Many varied perceptual-motor training programs are available to the teacher who wishes to use them. Of special importance for this study, a review of these programs reveals a large majority of them seem to be centered around the same activities included in Success Through Play by D. H. Radler and Newell C. Kephart. This is especially true in reference to motor development programs with the emotionally disturbed child. Although perceptual-motor programs are currently viewed as significant for disturbed children, little research is available to support the use of such programs. More specifically, the results of perceptual-motor training with emotionally disturbed children are not conclusive enough to determine what effect, if any, perceptual-motor training has on the perceptual-motor skills of these children.

Therefore, this study was undertaken in order to determine whether a perceptual-motor program such as the one outlined by Radler and Kephart would affect the perceptual-motor skills of emotionally disturbed children. The type of children used in this study could be placed in Kephart's second category. To review, they were children with emotional disturbances which extended over time. They were also receiving treatment in residential treatment centers or special public school classes.

Statement of Purpose

The primary purpose of this study was to determine if the program of perceptual-motor training outlined by D. H. Radler and Newell C. Kephart in their book, Success Through Play, would increase the perceptual-motor skills of emotionally disturbed children as measured by the Purdue Perceptual Motor Survey.

The secondary purpose of this study was to compare the scores of withdrawn and acting-out children in order to determine if the program would be more effective with one group than the other.

Hypotheses

1) There will be no statistically significant differences between the total pre- and post-test scores of experimental and control groups at the .01 level of significance.
2) There will be no statistically significant differences between pre- and post-test scores of withdrawn children in experimental and control groups at the .01 level of significance.
3) There will be no statistically significant differences between pre- and post-test scores of acting-out children in experimental and control groups at the .01 level of significance.

Delimitations of the Study

1) The children used in the study were from Sumner School, Waverly Children's Home, and Edgefield Lodge, all in the Portland, Oregon metropolitan area.
2) The study was conducted for a period of nine weeks -- one grading period for public elementary schools.
3) The study was limited to twenty subjects whose ages ranged approximately from six to twelve years.
4) The children were identified to be withdrawn or acting-out on the basis of the diagnosis received by the agency upon their referral.
5) Five children were included in each of the following groups: Experimental Acting-Out, Control Acting-Out, Experimental Withdrawn, and Control Withdrawn.

CHAPTER II

RELATED RESEARCH

As previously stated, there appears to be a paucity of published information related to perceptual-motor training with emotionally disturbed children. This is not to say that it has not been studied, only that it has not yet been published. Many of the studies included in this review of the related research are not specifically the type done in this experiment. However, each was included because of its relatedness to the topics of either perceptual-motor training or emotionally disturbed children.

A study by A. Jean Ayers[1] examined deficits in eye-hand coordination (a perceptual-motor function) in 100 six and seven year old children. The children were given a battery of tests covering visual, tactile, and proprioceptive perception, as well as some motor skills. None of the children had a diagnosis of cerebral palsy, but all had, or at one time possessed, learning or behavioral problems. The scores were intercorrelated and analyzed to determine the presence of any syndromes of dysfunction. Five syndromes were found and include deficits in tactile perception

[1]Ayers, A. Jean, "The Development of Perceptual-Motor Abilities: Theoretical Basis for Treatment of Dysfunction", American Journal of Occupational Therapy, 1963, pp. 221-225.

related to hyperactivity, distractible behavior, and a defensive response to some tactile stimuli; deficiency in figure-ground perception; a tendency to avoid crossing the mid-line of the body with hands when engaged in a motor task; and difficulty in learning to identify left and right sides of the body.

In a later study by Ayers[2] an analysis of 100 children (50 with and 50 without perceptual deficits) led to hypothesizing five syndromes characteristic of perceptual dysfunction. They were developmental aproxia (a deficit in motor planning, tactile perception and finger identification); tactile, kinesthetic, and visual perceptual dysfunction in form and position in space; tactile defensiveness which is associated with hyperactivity, distractibility, and defensive responses to tactile stimuli; deficit in integration of two sides of the body such as midline crossing and discrimination of left and right; and visual-figure-ground deficit.

In 1969 Bertha K. Stravrianos and Sylvia C. Landsman[3] studied Rorschach protocols of 311 socioeconomically and culturally privileged boys. The boys were from six to twelve years old and were of average to superior intellectual ability. The were classified as to dysfunction in

[2]Ayers, A. Jean, "Patterns of Perceptual-Motor Dysfunction in Children: A Factor Analytic Study", Perceptual and Motor Skills, 1965, pp. 335-368.

[3]Stravrianos, Bertha K. and Landsman, Sylvia C., "Personality Patterns of Deficient Readers with Perceptual-Motor Problems", Psychology in the Schools, 1969, pp. 109-123.

reading and perceptual-motor processes. These researchers found: 1) deficient readers showed normal and mature personality patterns and a high percentage of restricted responsiveness to their environment; 2) adequate readers outwardly expressed their emotions; 3) deficient readers with perceptual-motor dysfunction showed a withdrawal from outside stimuli. They felt that their study indicated that educators and clinicians should avoid blanket generalizations concerning emotional reactions associated with reading deficits regardless of the cause or the intellectual potential and age level of the child.

In a study by Wiggins, Brokaw, Heckel, and Salzberg[4], the effects of measured and judged anxiety on a perceptual-motor task were examined. They used patients with high and low anxiety and a control group of college students. They found that judged anxiety was the better predictor of perceptual-motor performance than measured anxiety. A stasiometer was used to measure the anxiety.

In 1964 Safrin[5] conducted a study which explored the applicability and scope of Bender's theory of "maturational lag" in functional childhood psychosis. Tests of visual perception, visual-motor performance and a clinical

[4]Wiggins, S.L., Brokaw, J.R., Heckel, R.V., and Salzberg, H.C., "Manifest Anxiety and Perceptual-Motor Steadiness", Perceptual and Motor Skills, 1962, pp. 759-762.

[5]Safrin, Renate Kersten, "Differences in Visual Perception and in Visual-Motor Functioning between Psychotic and Non-psychotic Children", Journal of Consulting Psychology, 1964, pp. 41-45.

evaluation of the presence of central nervous system deviations consistent with Bender's criteria for childhood schizophrenia were performed on 39 psychotic and 57 non-psychotic eight to twelve year old boys. No difference in accuracy or variability of performance in the perceptual- and visual-motor tasks was found when appropriate controls for large group differences in mental age functioning were instituted. No difference was found in test performance in psychotic children, with and without central nervous system deviations. With the mental age level constant, the difference in incidence of central nervous system deviations between psychotics and non-psychotics was insignificant. The results did not support Bender's organic theory.

Berkowitz[6] studied the relationship between psychophysical functioning and mental illness in children. She examined 64 children, 43 of whom were psychotic and 21 who were not psychotic. The four performance areas which were investigated were motor activity, visual perception, memory functions, and laterality. There was a significant difference found in all of the areas and there was deficient psychophysical performance among psychotic children. It was suggested that there is a direct relationship between the level of psychophysical functioning and the severity of the psychological maladjustment. The psychophysical function

[6]Berkowitz, Pearl H., "Some Psychophysical Aspects of Mental Illness in Children", Genetic Psychological Monograph, 1961, pp. 103-148.

which was most sensitive to psychological deviations was the psycho-motor area.

A study was conducted by Llorens, Rubin, Braun, Beck, Mottley, and Beall[7] at the Lafayette Clinic in Detroit in 1967 in which 18 emotionally disturbed children were tested. They were administered the Frostig Development Test of Visual Perception, portions of the Lee Clark Reading Readiness Test, and portions of the Monroe Reading Aptitude Test. Orientation was tested through a verbal questionnaire, and tactual perception was measured through the use of localization, stereognostic, and discrimination of stimulus techniques. All of the functions were rated on a continuum of chronological age expectancy. They found that 78 percent demonstrated undeveloped or inadequate functioning in motor skills, which indicated to them that early retraining in cognitive, perceptual, and motor functioning might be considered valuable in helping the child cope effectively with his environment.

The Gesell Scales of Motor, Adaptive, Personal-Social, and Language Behavior were given before and after an eight-month training period to mentally retarded toddlers in a study by Frances L. Ilg and Louise Bates Ames[8]. These

[7]Llorens, L.A., Rubin, E.Z., Braun, J., Beck, G., Mottley, N., and Beall, D., "Cognitive and Perceptual-Motor Functions: A Preliminary Report on Training In", American Journal of Occupational Therapy, 1964, pp. 202-207.

[8]Ilg, Frances L., and Ames, Louise Bates, Gesell Institute of Child Development, Harper and Row, New York, 1965.

children had an average mental age of 15 months. While it would be expected that motor development would improve significantly due to sensory-motor training, it is especially interesting that the other three behavior scales, i.e., the Adaptive, Language, and Personal-Social Scales, also improved significantly. The experimental groups averaged 7.7 months mental age gain in eight months compared to 1.9 months for the controls, who were given individual attention but not sensory-motor training. The design of the above study was the most closely related to this experiment of all studies researched.

Since the review of literature did not divulge research undertaken in perceptual-motor learning as related to the emotionally disturbed child, it was necessary that allied studies be utilized. These studies all examined perceptual-motor deficits which are found in many emotionally disturbed children, but they did not specifically investigate the relationship of those two areas. This experiment was undertaken because the study of perceptual-motor skills in specific relationship to emotionally disturbed children was not found.

CHAPTER III

METHODS AND PROCEDURES

Sampling and Assignment

Three agencies dealing with emotionally disturbed children in the Portland metropolitan area contained the population from which a sample of 20 emotionally disturbed children between the ages of six and twelve, who were recommended for the study by the respective agencies, were obtained. One agency was a public school with two classrooms for emotionally disturbed children; another was a semi-residential center with a school system of small classes on the campus and the children live there during the week, but go home on weekends; the other was a completely residential treatment center with teachers coming to the agency and working with one or two children at a time. The children were chosen on the basis that they were at least six years old and no more than twelve years old and that they were not presently in a perceptual-motor training program.

The subjects were matched in pairs according to their chronological ages and clinical diagnoses of withdrawn or acting-out. One subject in each pair was randomly chosen to be a part of the experimental group by the toss of a coin.

The other subject in each of the pairs was placed in the control group.

Two experimenters worked with the subjects in both the experimental and control groups. The children were listed alphabetically within both the experimental and control groups and numbered consecutively from one to twenty. Experimenter I was assigned to work with all odd-numbered subjects in both the experimental and control groups. Experimenter II was assigned all even-numbered subjects in both experimental and control groups.

Testing Procedures

All of the subjects were administered the Purdue Perceptual-Motor Survey (PPMS) (Appendix C) before any training or individual attention was begun. The scores from this test were recorded on a PPMS score sheet (Appendix A) and a PPMS summary sheet (Appendix B).

At the end of the training period, each child was again administered the PPMS. The same procedure was followed as with the pre-test and the scores entered on PPMS score sheets. The scores were then compared on a summary sheet for each subject, noting the increase or decrease in competency in both raw scores and percentage points.

Scoring

Each of the test items in the PPMS was scored according to Kephart's system of evaluation which can be found in

Appendix D. Each child obtained a score from one to four on each test item. Four indicates a competent performance and one generally indicates that the child cannot perform the task. Each child may obtain a possible total raw score ranging between 22 and 88.

Training of Experimenters

In order to familiarize the children with their new surroundings, the experimenters acquainted themselves with the subjects used in the study before any testing or training was conducted. Both experimenters had previous experience working directly with emotionally disturbed children. Also, the experimenters each scored both the pre- and post-tests as they were administered to check their accuracy in scoring as well as administering the PPMS.

Equipment

All equipment used in both the testing and the training program was built according to Kephart's specifications. The activities included in this study involving balance boards, drawing games, and pegboard games were taken from the book, Success Through Play, while the others were taken from the Purdue Perceptual-Motor Survey manual.

Angels in the Snow. A small throw rug was used for the child to lie upon while performing the prescribed tasks.

Walking Board. An eight foot long plank, 2" x 4", was placed between two brackets which are diagrammed below.

Testing was executed on the four inch side of the 2" x 4" plank.

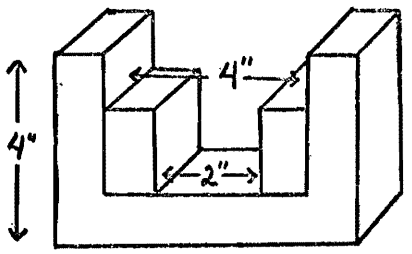


Figure 1. Walking board bracket.

Balance Boards. A square platform, 16" x 16", was used for each balance board. Underneath the platform and centrally located was a small post, three inches high, attached to the board by a screw. Three sizes of balance posts were used: 5" x 5", 4" x 4", and 3" x 3".

Drawing Games. A chalkboard, three feet by four feet or larger, was used. It was without design. Also needed were several pieces of chalk and an eraser.

Pegboard Games. Two pieces of pegboard not smaller than 16" x 20" and having at least 100 holes were used. Also used in place of pegs were the recommended 100 golf tees in equal amounts of each of five colors.

Marsden Ball. A soft rubber ball about the size of a tennis ball was suspended by fishing line from the ceiling via an eyelet screw or similar means. The fishing line was

attached by threading it through the ball and attaching a snap or button so that it would not draw back through.

Obstacle Course. A broom handle or similar object was used which was approximately three feet long.

Ocular Pursuits. A pencil with a visible eraser was used.

Visual Achievement Forms. A piece of blank paper, approximately the size of notebook paper (8-1/2" x 11"), a pencil, and the seven visual achievement forms drawn on 4" x 6" blank notecards were used.

Rhythmic Writing. A chalkboard, chalk, an eraser, and the eight motifs on paper approximately 4" x 11" were used.

Training Activities

Experimental Group. Each experimental child received training in each of the six main areas (Appendix E) for one half hour a day, three days a week for nine weeks. His accomplishment of each step in the task was recorded on a progress chart (Appendix D). The time allocation at each step was in accordance with the individual needs of each child. When he could competently perform a task on a regular basis, the date of accomplishment was recorded. A record was also kept of how much time was spent on each activity every day. The exact training procedures are described in Appendix E.

Control Group. Each child in the control group received for one half hour a day, three days a week for nine weeks, some type of physical or quiet activity on a one-to-one basis with an experimenter. A record was kept of how much time was spent on each control activity in order to keep them somewhat evenly divided between quiet and physical activities. These included basketball, checkers, coloring, running, and other similar activities. The activity sessions were purposely non-instructional and unstructured, and the selection of specific activities during each session were predominantly of the child's own choosing.

Statistical Procedures

An analysis of variance with repeated measures was used to correlate the relationships of pre- and post-test scores to control and experimental, and also acting-out and withdrawn subjects. The percentage of change between pre-test scores and post-test scores was determined for each of the subtest areas of the PPMS.

CHAPTER IV

ANALYSIS OF DATA AND FINDINGS

This chapter presents the analysis of data and findings for each null hypothesis posed in this experiment. In addition, graphs and relevant charts have been included to pictorially illustrate the raw scores. The findings should be interpreted with an awareness of the delimitations of this study.

Data Relative to Null Hypotheses

A pre-test analysis of variance showed that there was no significant difference between experimental and control groups in perceptual motor abilities before treatment. That is, all the variance was within the groups rather than between the groups, and neither variance was significant at the .75 level.

TABLE I

PRE-TEST ANALYSIS OF VARIANCE

Source	SGC*	SS	df	MS	f
Between Groups	(4)	936.2	3	312.06	2.0170
	(2)	.6	1	.60	
Within Groups	(4)	2940.4	19	154.75	.0028
	(2)	4148.0	19	218.32	

*SGC = Sub-Groups Compared

A three-factor analysis of variance with repeated measure and unequal numbers was used to analyze the significance of the differences in pre- and post-test scores between and within the subdivisions of experimental and control, withdrawn and acting-out. One subject was removed from school during the course of the experiment, necessitating the deletion of his scores; hence, the lesser number of subjects in the control withdrawn group.

The following charts and tables illustrate the scores of all children in both pre- and post-tests and depict the differences in many ways. The abbreviations used for each group of subjects are: EAO for Experimental Acting-Out; CAO for Control Acting-Out; EWD for Experimental Withdrawn; and CWD for Control Withdrawn.

The actual figures used in the post-test analysis of variance with repeated measure and unequal numbers are shown in Table II. When reading across the table, it can be noted that there was not a significant difference beyond the .01 level between the scores of (A) the experimental and control groups. However, there was a significant difference beyond the .01 level for (B) the acting-out and withdrawn groups, (C) all pre- and post-test scores, as well as between (AC) pre- and post-tests of both experimental and control groups. No significant difference beyond the .01 level was found between (BC) the pre- and post-test scores of the acting-out and withdrawn groups.

TABLE II

POST-TEST ANALYSIS OF VARIANCE

Source	SS	df	MS	f	Level of Significance
A	868.147	1	868.147	5.580	.05
B	1289.504	1	1289.504	8.288	.01
AB	182.371	1	182.371	1.172	
Subwgp	5289.900	34	155.580		
C	1078.496	1	1078.496	124.466	.01
AC	373.503	1	373.503	43.105	.01
BC	15.920	1	15.920	1.837	
ABC	267.057	1	267.057		
Error	294.600	34	8.665		

A = Treatment (Experimental and Control)

B = Diagnosis (Acting-Out and Withdrawn)

C = Testing (Pre- and Post-)

Subwgp = Error Term

Table III presents a comparison of the total and mean scores by group. An analysis of this table reveals that the EAO group improved their post-test scores over their pre-test scores a total of 77 points, or an average of 15.4 points each. The EWD group improved their scores a total of 111 points, or an average of 22 points each. The CAO group improved a total of 17 points, an average of 3.4 points each; and the CWD group improved a total of 8 points, an average of 2 points each.

TABLE III

A COMPARISON OF TOTAL AND MEAN SCORES OF GROUPS

		C^1		C^2		Total Differences	
		Total Scores	Mean Scores	Total Scores	Mean Scores	Total Scores	Mean Scores
A^1	B^1	278	55.6	355	71.0	77	15.4
	B^2	224	45.0	335	67.0	111	22.0
A^2	B^1	282	56.4	299	59.8	17	3.4
	B^2	164	41.0	172	43.0	8	2.0

A^1 = Experimental

A^2 = Control

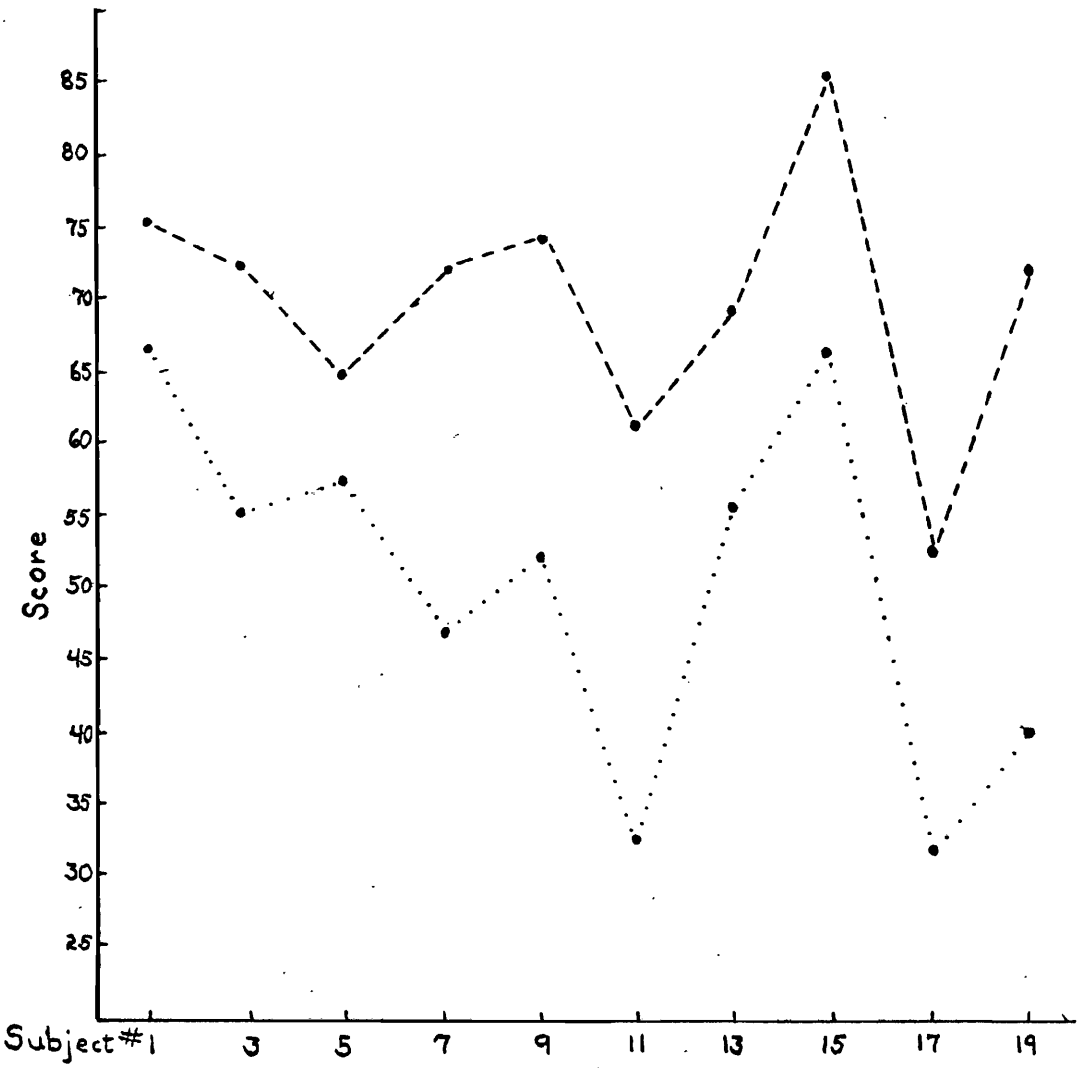
B^1 = Acting-Out

B^2 = Withdrawn

C^1 = Pre-Test

C^2 = Post-test

An illustration of the notable improvement between the individual pre- and post-test scores for all experimental subjects is shown in Figure 2.



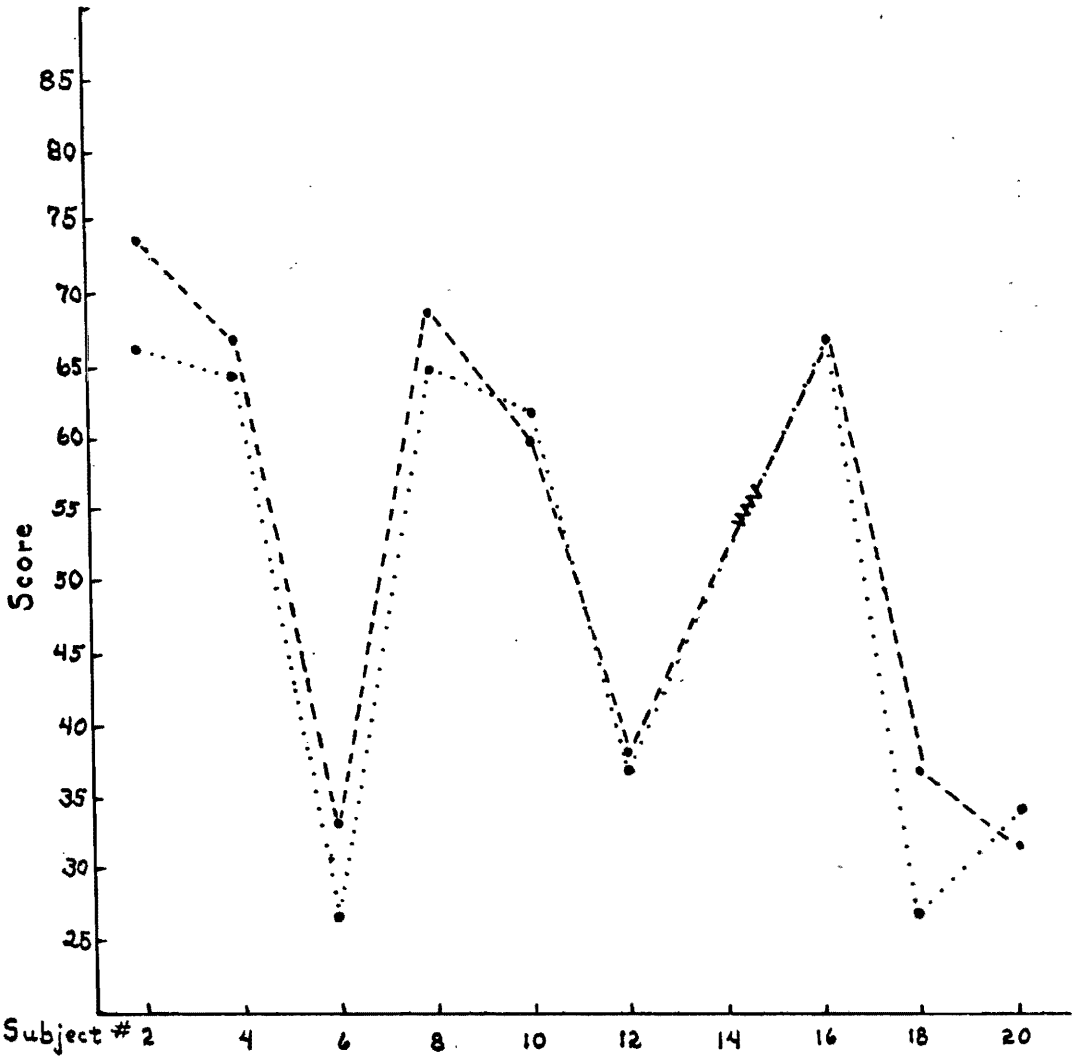
All Experimental Subjects

..... Pre-test score

------ Post-test score

Figure 2. A comparison of pre- and post-test scores for all experimental subjects.

Figure 3 is an illustration of the small amount of individual improvement in the pre- and post-test scores for all control subjects.



All Control Subjects

····· Pre-test score

-------- Post-test score

Figure 3. A comparison of pre- and post-test scores for all control subjects.

The following two graphs presented in Figure 4 illustrate the differences between the pre- and post-test scores for all acting-out subjects.

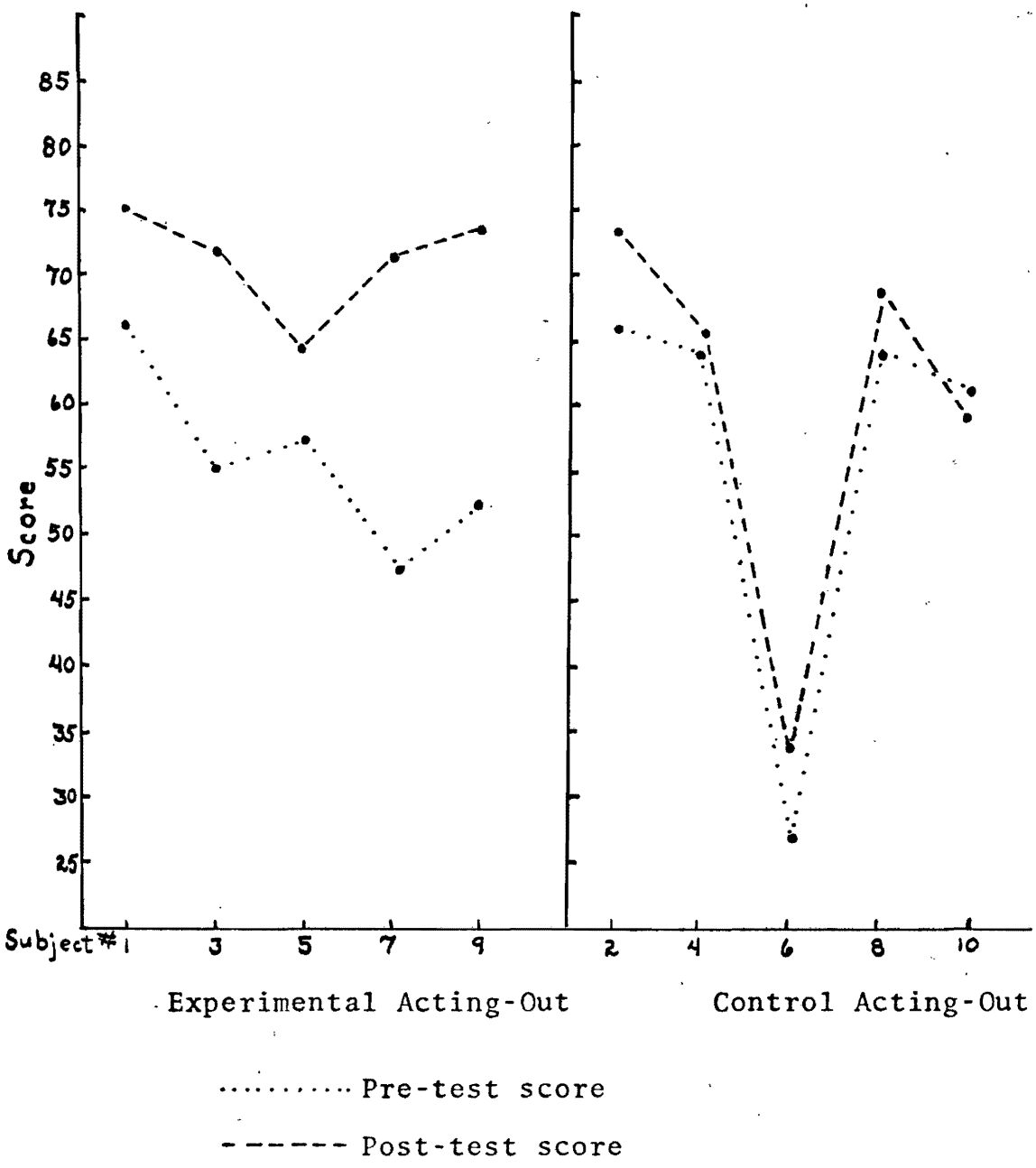


Figure 4. A comparison of pre- and post-test scores for all acting-out subjects.

The differences between the pre- and post-test scores for all withdrawn subjects are illustrated in the two graphs presented in Figure 5.

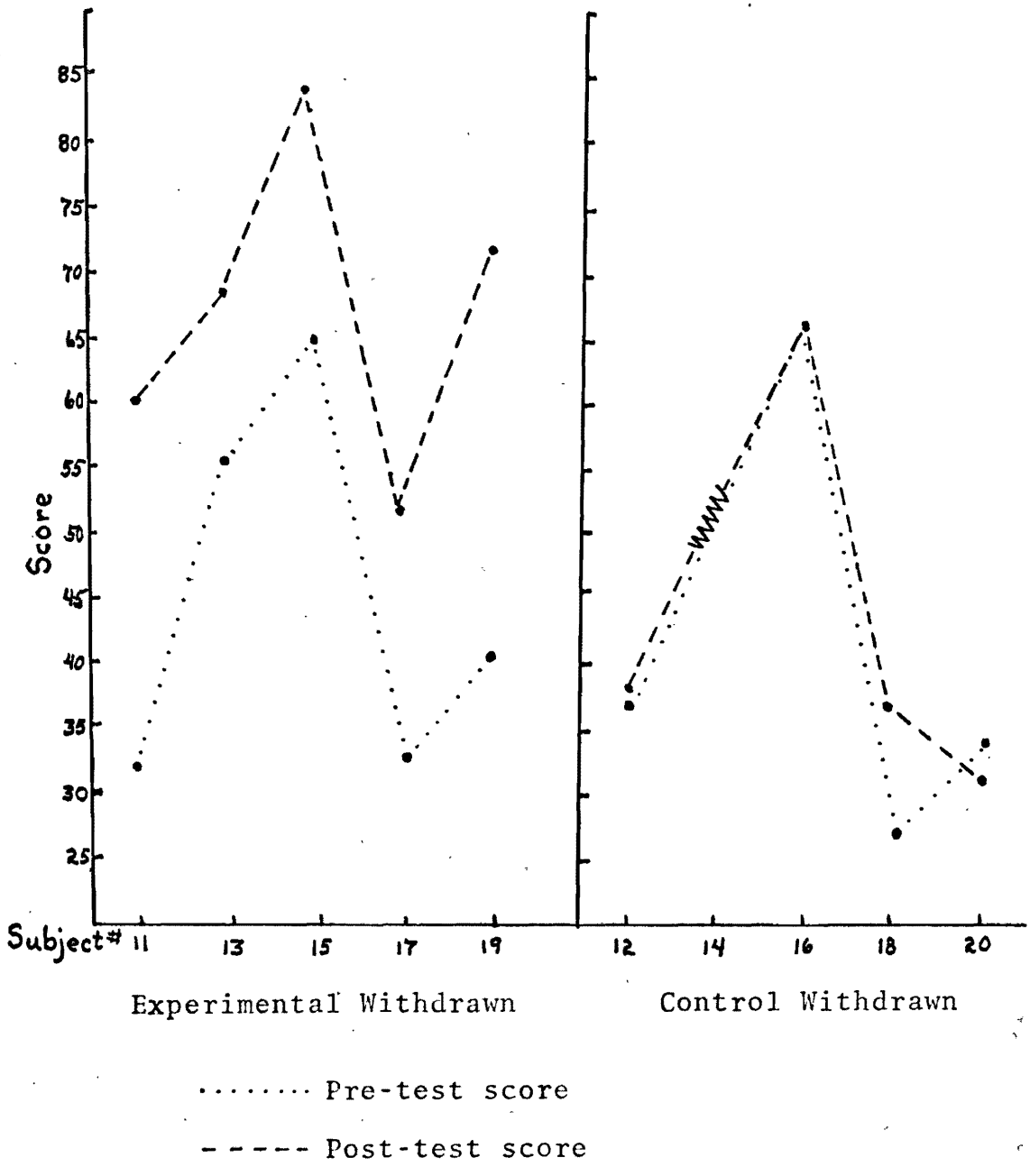


Figure 5. A comparison of pre- and post-test scores for all withdrawn subjects.

Data Relative to Raw and Percentage Scores

Table IV presents the subjects by name and identifies the group in which they were randomly placed. They are listed by matched pairs, with the first child being in the experimental group, the second in the control group, etc. The point differences between their pre- and post-test scores are listed and the corresponding percentage of gain or loss for each subject is also presented. The greatest percentage of gain was 87.5% by subject #11 and the greatest percentage of loss was -9.0% by subject #20. The entire table is presented on the following page.

TABLE IV

COMPARISON OF RAW AND PERCENTAGE SCORES FOR ALL SUBJECTS ON PRE- AND POST-TESTS

Group	No.	Name	Pre-Test Score	Post-Test Score	Difference	% Change
EAO	1	Curtis	67	75	+8	12.0
CAO	2	Steve A.	66	73	+7	11.0
EAO	3	Todd	55	72	+17	31.0
CAO	4	Darrell	64	66	+2	3.0
EAO	5	Billy	57	64	+7	12.0
CAO	6	Neil	27	33	+6	22.0
EAO	7	Mark S.	47	71	+24	51.0
CAO	8	Rodger	64	68	+4	6.0
EAO	9	Robert	52	73	+21	40.0
CAO	10	Danny	61	59	-2	-3.0
EWD	11	Charlie	32	60	+28	87.5
CWD	12	Steve H.	37	38	+1	2.7
EWD	13	David	55	68	+13	24.0
CWD	14	Teddy	49	(Withdrawn from study)		
EWD	15	Carolyn	65	84	+19	29.0
CWD	16	Chuck	66	66	0	0.0
EWD	17	Ricky	32	52	+20	62.5
CWD	18	Greg	27	37	+10	37.0
EWD	19	Lorraine	40	71	+31	77.5
CWD	20	Mark L.	34	31	-3	-9.0

Key: EAO = Experimental Acting-Out

CAO = Control Acting-Out

EWD = Experimental Withdrawn

CWD = Control Withdrawn

Figure 6 pictorially presents a comparison of the matched pairs of subjects and illustrates the differences between their percentage of total gain or loss in test scores. Matched pair #10 showed the largest difference in test scores, while in pair #3 the control subject actually gained more than the experimental subject.

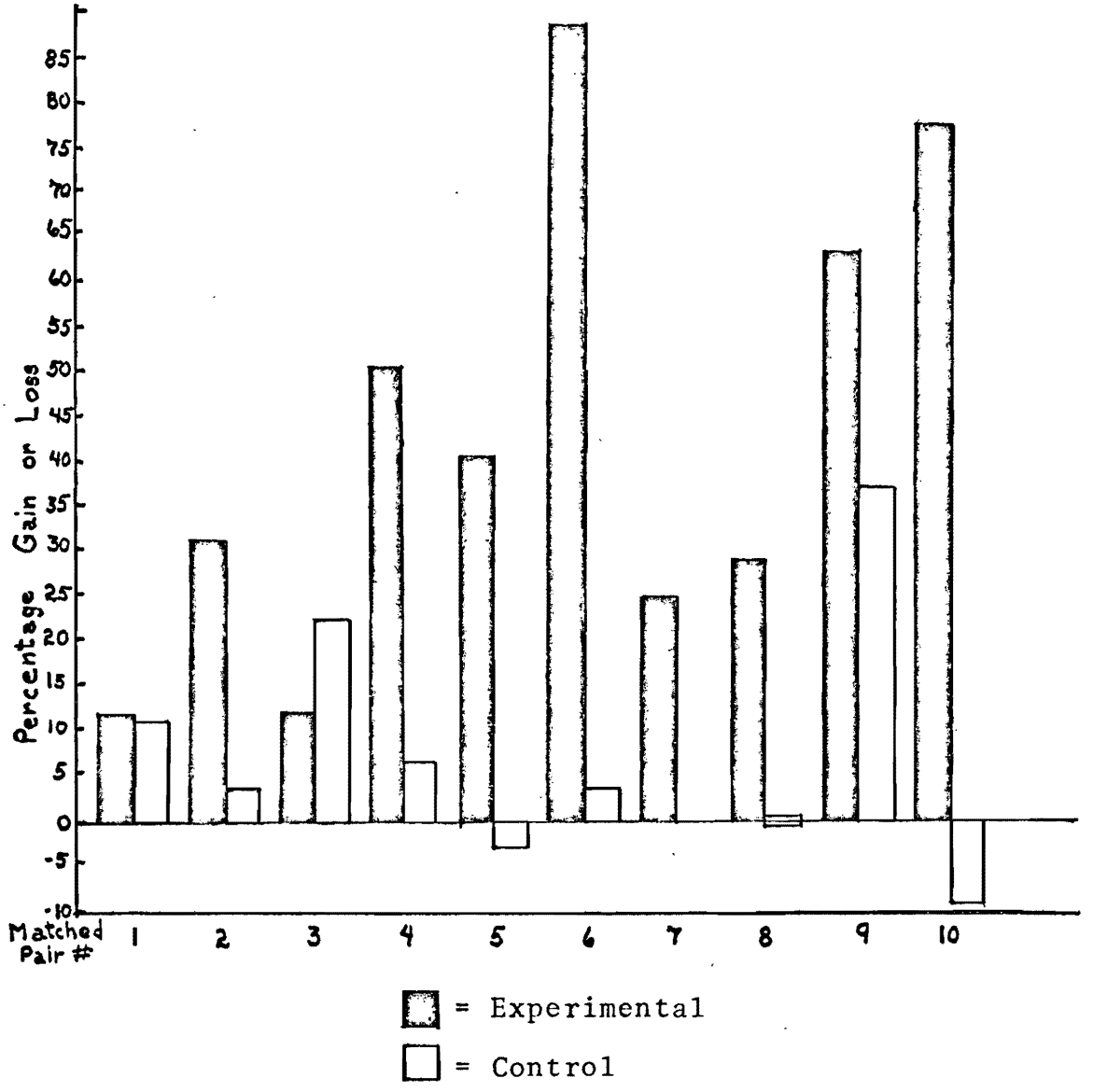


Figure 6. Comparison of percentage gain or loss for matched pairs on pre- and post-tests.

Table V presents a comparison of the mean percentages gained by each group. It can be noted that the experimental withdrawn group had the highest mean gain, followed by the experimental acting-out, the control acting-out, and the control withdrawn, in that order.

TABLE V

COMPARISON OF MEAN GAIN PERCENTAGES BY GROUP

EAO mean gain percentage	29.20%
CAO mean gain percentage	7.80%
EWD mean gain percentage	61.20%
CWD mean gain percentage	7.25%

The Purdue Perceptual Motor Survey divides the test items into five subdivisions. Table VI illustrates the change each subject made between the pre- and post-testing and presents the totals and mean for each group in these five subdivisions. An analysis of this table reveals that the greatest improvements by the experimental subjects were in the areas of Body Image and Differentiation, and Perceptual-Motor Match. The control subjects also made the greatest improvements in the area of Body Image and Differentiation, but to a lesser degree than the experimental group. Actual declines were recorded for the control groups in the area of Perceptual-Motor Match. The entire table is presented on the following page.

TABLE VI

PRE- AND POST-TEST SCORE DIFFERENCES ACCORDING TO THE SUBDIVISIONS OF THE PURDUE PERCEPTUAL MOTOR SURVEY

Group	Balance and Posture	Body Image and Differentiation	Perceptual-Motor Match	Ocular Pursuit	Form Perception
EAO	2	3	1	2	0
	3	6	3	5	0
	5	6	4	-8	0
	4	7	4	6	3
	3	7	7	4	0
Total	17	29	19	9	3
Mean	3.4	5.8	3.8	1.8	0.6
CAO	-2	-1	0	7	3
	-1	2	2	0	-1
	0	2	4	0	0
	6	3	-6	0	1
	-3	6	-3	-4	2
Total	0	12	-3	3	5
Mean	0	2.4	-0.6	0.6	1.0
EWD	5	9	11	3	0
	5	7	4	-6	3
	4	3	9	3	0
	7	6	7	0	0
	6	9	11	5	0
Total	27	34	42	5	3
Mean	5.4	6.8	8.4	1.0	0.6
CWD	4	0	-2	1	-2
	1	-3	-5	6	1
	3	4	4	-3	2
	-2	2	-3	0	0
Total	6	3	-6	4	1
Mean	1.2	0.6	-1.2	0.8	0.2

Findings

Three null hypotheses were proposed. A .01 level of significance was considered necessary for rejection of the hypotheses because of the small number of subjects in the study.

1. The first null hypothesis proposed that there would be no statistically significant differences between the total pre- and post-test scores of experimental and control groups. The analysis of variance reveals a difference significant at the .05 level between the pre- and post-test scores of experimental and control groups, but not significant at the .01 level. The first null hypothesis is therefore accepted.

2. The second null hypothesis proposed that there would be no statistically significant differences between the pre- and post-test scores of withdrawn subjects in experimental and control groups. The analysis of variance reveals a difference significant at the .01 level between the pre- and post-test scores of withdrawn children in experimental and control groups. The second null hypothesis is therefore rejected.

3. The third null hypothesis proposed that there would be no statistically significant differences between the pre- and post-test scores of acting-out children in experimental and control groups. The analysis of variance reveals a difference significant at the .01 level between

the pre- and post-test scores of acting-out children in experimental and control groups. The third null hypothesis is therefore rejected.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

This study was conducted to determine if the program of perceptual-motor training outlined by D.H. Radler and Newell C. Kephart in their book, Success Through Play, would increase the perceptual-motor skills of emotionally disturbed children as measured by the Purdue Perceptual Motor Survey. Twenty children from the Portland, Oregon metropolitan area whose ages ranged from six to twelve years were included in the experiment. These children were grouped according to their diagnosis of withdrawn or acting-out which was received by the agency upon their referral. Three agencies participated in the study.

Each child was administered the Purdue Perceptual Motor Survey before any treatment was begun and their scores recorded on a summary sheet (Appendix B) for comparison with the scores which they would obtain when they were retested after the experiment was completed. Then for the next nine weeks, three days a week and one half hour a day, the subjects in the experimental group received the training outlined in Success Through Play and the subjects in the control group received quiet or physical activity

for an equal amount of time. At the end of this time, each child was again administered the Purdue Perceptual Motor Survey and the score was recorded.

The correlation of these pre- and post-test scores showed that the subjects in the experimental acting-out group improved their perceptual-motor skills significantly more than the control acting-out group; and the experimental withdrawn group improved their perceptual-motor skills significantly more than the control withdrawn group.

Conclusions

The following conclusions seem warranted within the delimitations imposed by the experimental design of this study:

1. As a result of this experiment, it can be concluded that the tasks prescribed by Radler and Kephart in their book, Success Through Play, can improve the perceptual-motor skills of emotionally disturbed children, as measured by the Purdue Perceptual Motor Survey.

2. When each group is studied separately, it is shown that this training is most effective with the children diagnosed as withdrawn (Tables II and III). The children diagnosed as acting-out improved significantly, but not to the extent that the withdrawn did. This may be because the withdrawn children had lower pre-test scores.

3. It must also be noted that the control groups also showed an over-all improvement in their perceptual-

motor skills, possibly due to the individual attention and help they received on their physical and quiet activities. This improvement might also be attributed to maturation and/or growth.

4. In looking at the subdivisions of the Purdue Perceptual Motor Survey, it is found that the greatest improvements by the experimental subjects were in the areas of Body Image and Differentiation, and Perceptual-Motor Match. The experimental subjects improved in all subdivisions, when looked at as a group, although two subjects actually declined in performance of the Ocular Pursuit tasks (Table VI). It is concluded that this improvement is directly attributable to the performance of the experimental tasks of this study.

Recommendations

As a result of the findings and conclusions of this experimental study, the following recommendations are made:

1) Emotionally disturbed children with diagnoses of withdrawn and acting-out should be involved in programs such as the one used in this study to improve their perceptual-motor skills.
2) Increased attention should be given to the value of working with emotionally disturbed children on a one-to-one basis in both treatment centers and schools.
3) More research should be undertaken to determine

plays in children's growth and maturation.

4) Extensive perceptual-motor training programs should be developed for the specific needs of emotionally disturbed children.

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APPENDIX A

PURDUE PERCEPTUAL MOTOR SURVEY SCORE SHEET

Name_____ Date of birth_____

Agency_____ Sex_____ Grade_____

Diagnosis_____

Examiner_____ Date of Exam_____

	4	3	2	1	
Walking Board					Balance and Posture
Forward					
Backward					
Sideways					
Jumping					
Identification of Body Parts					Body Image and Differentiation
Imitation of Movement					
Obstacle Course					
Kraus-Weber					
Angels-in-the-Snow					
Chalkboard					Perceptual-Motor Match
Circle					
Double Circle					
Lateral Line					
Vertical Line					
Rhythmic Writing					
Rhythm					
Reproduction					
Orientation					
Ocular Pursuits					Ocular Control
Both Eyes					
Right Eye					
Left Eye					
Push-Up					

	4	3	2	1	
Visual Achievement Forms Form					Form Perception
Organization					

Comments:

BALANCE AND POSTURAL FLEXIBILITY

1. WALKING BOARD

Forward

Steps off board	___	
Pauses frequently	___	
Uses one side of the body more consistently than other	___	
Avoids balance:		
Runs	___	
Long steps	___	
Feet crosswise of board	___	Score

Backward

Steps off board	___	
Pauses frequently	___	
Uses one side of the body more consistently than other	___	
Avoids balance:		
Runs	___	
Long steps	___	
Feet crosswise of board	___	
Twists body to see	___	
Must look at feet	___	Score
Maintains inflexible posture	___	

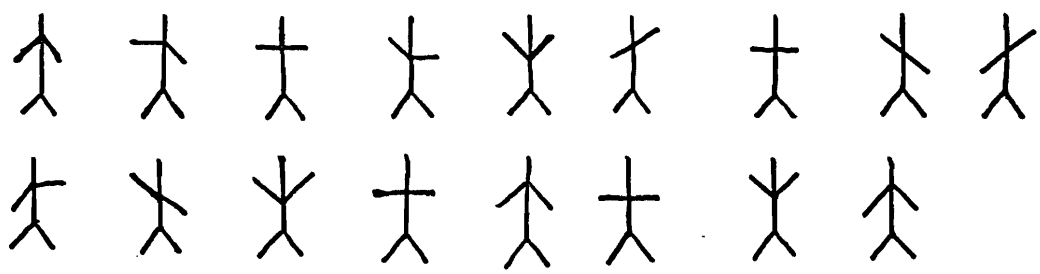
Sideways	
Unable to shift weight from one foot to the other ___ Confusion or hesitation in shifting weight ___ Crosses one foot over the other ___ Steps off board ___ Performs more easily in one direction than the other: Right lead ___ Left lead ___	Score
2. JUMPING — Both Feet	
Cannot keep both feet together ___ Uses one side of body only ___ "Ties" one side of body to the other ___	
One Foot	
Postural shift not smooth ___ Cannot keep opposite foot off the floor ___ Performance better on one foot than the other: Right ___ Left ___	
Skip	
Movement not free ___ Hesitates after each step to determine which side to use ___	

Hop	
Cannot remain in one spot while performing ___ Cannot shift easily from side to side ___ Movements jerky and lack rhythm: All patterns ___ Asymmetrical patterns only ___	
	Score

3. IDENTIFICATION OF BODY PARTS

Shows hesitency in one or more responses ___ Does not touch both members of paired parts ___ Must "feel around" to find parts ___ Makes more than one error in identification ___	Score

4. IMITATION OF MOVEMENT



Does not mirror the patterns ___ Not consistent (sometimes mirror, sometimes parallel) ___ Shows hesitation or lack of certainty ___	

Makes abortive movements ___ Moves wrong limb ___ Recognizes errors after some delay ___ Does not recognize errors spontaneously ___	Score
5. OBSTACLE COURSE	
Going Over	
Overestimates (steps too high) ___ Catches foot on bar ___ Cannot correct on one repetition ___	
Going Under	
Knocks bar off ___ Bends too low to clear bar ___ Cannot correct on one repetition ___	
Going Between	
Does not turn body ___	
	Score
6. KRAUS-WEBER	
Cannot raise chest and hold ___ Cannot raise legs and hold ___	Score
7. ANGELS-IN-THE-SNOW	
Must look from one limb to the other to identify ___ Cannot identify by visual data alone ___	

Requires tactual information to identify limbs	___	
Taps or moves limb on floor to identify	___	
Abortive movements to get started	___	
Hesitation at beginning of movement	___	
Movements are hesitant and jerky	___	
Overflow into other limbs than those called for	___	
Movements do not reach maximum extension	___	
Requests repetition of instructions	___	
Cannot correct response on one repetition	___	Score

8. CHALKBOARD

Circle

Does not reach proper size	___	
Direction incorrect for hand used	___	
Drawing not directly in front of child	___	
Does not cross midline	___	
Shape of circle not accurate	___	
Must stop to "think out" next move during performance	___	
Wrist is stiff and difficult to control	___	
Still shows difficulty after 3 or 4 attempts	___	Score

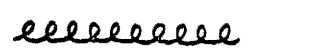
Double Circle		
Does not reach proper size	___	
First attempts are small and far apart	___	
Circles overlap	___	
One circle is larger than the other	___	
One more accurate than the other	___	
Circles drawn one on top of the other	___	
Direction incorrect		
Hands parallel	___	
Opposite but wrong direction	___	
Circles flat toward inside	___	
Inaccuracies which are not parallel in both circles	___	
Visual attention directed to one hand	___	
Movement of arms not synchronized	___	Score

Lateral Lines		
"Walks" across the board	___	
Draws left half with left hand, right half with right hand	___	
Pivots body to avoid crossing midline	___	
Difficulty when hand is on opposite side of midline	___	
False starts	___	
Pauses and confusion	___	Score
Inaccuracies	___	

Vertical Lines	
Lines bow Markedly ___ Slightly ___ Visual attention to one hand only ___ One hand ceases to function during performance ___ Hands move alternately, not simultaneously ___	Score

9. RHYTHMIC WRITING

Motifs

1. 
2. 
3. 
4. 
5. 
6. 
7. 
8. 

Hesitant and jerky ___ Movement cramped and inflexible ___ Rhythm not constant ___ Directional reversals or confusion ___ Order reversals or confusion ___ Line of motifs slants ___ Characters in motifs slant ___ Inaccurate reproduction ___ Size does not remain constant throughout performance ___ Characters become smaller as performance is sustained ___ Excessive movement of hips or trunk ___	Scores: Rhythm Reproduction Orientation

OCULAR CONTROL

10. OCULAR PURSUITS

Moves head instead of eyes ___
Eye movements are jerky ___
  Throughout ___
  At extremes only ___
Movement jerks at midline ___
Eyes do not work together ___
One eye remains stationary as other moves ___
One eye leads the other markedly ___
Overshoots or undershoots during pursuit ___
Looses visual contact with target during movement ___
When contact is lost, cannot regain easily ___
One eye "wanders off" the target
  Throughout ___
  At extremes only ___
Changes eyes at midline ___
Convergence
  Impossible at 4 inches ___
  Sluggish ___
  Uneven ___

Scores:

Both eyes

Right eye

Left eye

Convergence

FORM PERCEPTION

11. VISUAL ACHIEVEMENT FORMS

Form

Changes orientation of paper to alter direction of movement ___
Segments drawings ___

Internal lines of divided rectangle segmented	___	Score
"Ears" on forms	___	
Drawings markedly larger or smaller than copy	___	
Organization		
No discernible organization	___	Score
Organization on page is:		
Left to right	___	
Vertical	___	
Circular	___	

APPENDIX B

PURDUE PERCEPTUAL MOTOR SURVEY SUMMARY
SCORE SHEET

Name _____ Date of Birth _____

Agency _____ Sex _____

Diagnosis _____ Test Dates _____

	Pre-Test	Post-Test	Difference
Walking Board Forward			
Backward			
Sideways			
Jumping			
Identification of body parts			
Imitation of Movement			
Obstacle Course			
Kraus-Weber			
Angels-in-the-Snow			
Chalkboard Circle			
Double Circle			
Lateral Line			
Vertical Line			
Rhythmic Writing Rhythm			
Reproduction			
Orientation			
Ocular Pursuits Both Eyes			
Right Eye			
Left Eye			
Convergence			

Visual Achievement Forms Form			
Organization			
TOTALS			

(Sheet 2 of 2)

APPENDIX C

ASSESSMENT PROCEDURES

Test I - Walking Board

The examiner says to the child, "Get up on the board and walk to the other end." When the child has reached the far end of the board, the examiner says, "Now walk it backward." When he has crossed the board again, the examiner says, "Now walk it sideways." When he has walked the board sideways in one direction, the examiner says, "Now come back sideways."

Forward: If the child walks easily and maintains dynamic body balance throughout, he receives a score of 4. If the child has occasional difficulty but is able to regain balance each time, he receives a score of 3. If the child steps off the board more than once or if he pauses frequently, he receives a score of 2. If the child cannot perform or if more than one-fourth of his performance is out of balance, he receives a score of 1. Backward: If the child walks easily and maintains balance throughout without looking behind him, he receives a score of 4. If the child has occasional difficulty but is able to regain balance each time, he receives a score of 3. If the child steps off the board more than twice, if he pauses frequently, or if he cannot perform without looking behind him, he receives a

score of 2. If the child cannot perform, if he must feel with his toe, or if more than one-half of his performance is out of balance, he receives a 1. Sideways: If the child walks easily in either direction, he receives a score of 4. If the child has occasional difficulty but is able to regain balance each time, he receives a score of 3. If the child steps off the board more than two times in one direction or if he pauses frequently and has difficulty regaining balance, he receives a score of 2. If the child cannot perform, if his performance is markedly better in one direction than the other, or if his performance is markedly out of balance, he receives a score of 1.

Test II - Jumping

The examiner says, "Place both feet together and jump one step forward." Next he instructs the child, "Stand on your right foot with your left foot off the floor and jump one step forward without putting your left foot down." Then he says, "Now stand on your left foot with your right foot off the floor and jump forward without putting your right foot down." The examiner then asks the child to "skip across the room." The examiner next says to the child, "I want you to hop once on the right foot, then once on the left, once on the right, then left, and so on." If the child stops, the examiner says, "Keep going." If the child pauses between each hop, he says, "Can you go faster?" If he moves forward, the examiner says, "Stay in one place and

keep hopping." Next the examiner says, "Now hop twice on your right foot, twice on your left foot, and keep going." Next the examiner says, "Now hop twice with your left foot and once with your right and keep going."

If the child performs all tasks easily, he receives a score of 4. If the child can alternate sides symmetrically (all tasks), he receives a score of 3. If the child can hop on either foot at will (the first five tasks), he receives a score of 2. If the child can only perform symmetrically (fewer than five tasks performed adequately), he receives a score of 1.

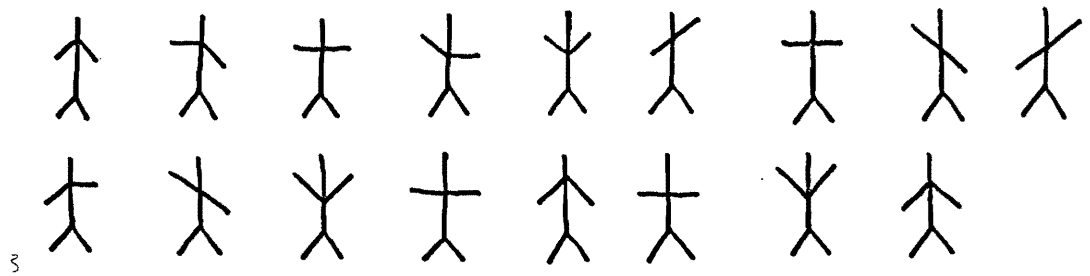
Test III - Identification of Body Parts

The examiner says, "Touch your shoulders. Touch your hips. Touch your head. Touch your ankles. Touch your ears. Touch your feet. Touch your eyes. Touch your elbows. Touch your mouth."

If the child performs adequately throughout, he receives a score of 4. If he shows only slight hesitancy or confusion, he receives a score of 3. If the child shows hesitancy in more than one or two of the commands or if he points to only one of the paired parts, he receives a score of 2. If the child is unable to identify one or more of the parts called for, if he shows marked hesitancy (except elbows), or if he "feels around" to find the part, he receives a score of 1.

Test IV - Imitation of Movements

The examiner says to the child, "I am going to move my arms and I want you to move your arms just like I do. Are you ready?" The examiner demonstrates the following positions:



If the child performs promptly, consistently, and surely on all patterns and only if he parallels the pattern so that his movements are an exact duplicate of the examiner's, he receives a score of 4. If the child performs promptly, consistently, and surely, but mirrors the examiner's movements, he receives a score of 3. If the child shows hesitation or a lack of certainty, he receives a score of 2. If the child makes more than one error or if there is abortive movement in several patterns, the child receives a score of 1.

Test V - Obstacle Course

The examiner takes a broom handle, placing it level with the child's knee height, says to the child, "Step over the stick." Placing the broom handle about two inches below the child's shoulder height, the examiner says, "Duck

under the stick." Then the examiner puts the end of the broom handle just far enough away from the wall so the child can get between the end of it and the wall if he turns his body sideways. The examiner then says, "Go between the wall and the stick without touching either."

If the child performs adequately throughout all the tasks, he receives a score of 4. If the child shows some hesitancy, but performs the tasks, he receives a score of 3. If the child touches the stick, but can perform the task correctly on one repetition, he receives a score of 2. If the child cannot perform the tasks on one repetition, he receives a score of 1.

Test VI - Kraus-Weber

The examiner has the child lie face down on a rug or mat and tells him to place his hands behind his head and clasp his hands together. The examiner holds the child's feet and says, "Raise your head, shoulders, and chest off the floor while I count to ten." Then the examiner says to the child, "Put your hands beneath your face. Raise your legs off the floor without bending your knees while I count to ten." The examiner holds the child's chest down by placing a hand between his shoulder blades.

If the child passes both tests, he receives a score of 4. If the child fails the second test, he receives a score of 3. If he fails the first test, he receives a score of 2. If the child fails both tests, he receives a score of 1.

Test VII - Angels-in-the-Snow

The examiner asks the child to lie on his back on a rug or mat with his legs together and his arms at his sides. He says to the child, "Move just this arm," pointing to the right arm. "Now move your arm back to your side." Then he says, "Move just this arm," pointing to the left arm. "Now move it back to your side." "Move just this leg," pointing to the right leg. "Now back together. Move just this leg," pointing to the left leg. "Now back together. Move both arms. Now back. Move both legs. Now back. Move this arm and this leg," the examiner now points to the left arm and left leg. "Now back. Move this arm and this leg," as the examiner points to the right arm and right leg. "Now back. Move this arm and this leg," the examiner is pointing to the right arm and left leg. "Now back. Move this arm and this leg," as he points to the left arm and right leg. "Now back."

If the child performs adequately throughout all the tasks, he receives a score of 4. If the child shows only slight hesitancy in some of the patterns or if he shows restricted movement or overflow which is corrected in one repetition, he receives a score of 3. If the child shows marked hesitancy in beginning the movements or if the extent of the movement becomes restricted in any of the patterns and he cannot correct this with one repetition of the instructions for that pattern, he receives a score of 2.

If the child cannot perform one or more of the tasks, if there is overflow to limbs not required in the pattern and he cannot correct this overflow in one repetition of the instructions, if he requires tactual information in addition to visual information in any of the tasks, or if he must "bang" the limb on the floor to identify it, he receives a score of 1.

Test VIII - Chalkboard

The examiner gives the child a piece of chalk and says, "Draw a circle." Next the examiner says, "Take a piece of chalk in each hand and draw two circles at the same time." Then the examiner asks the child to turn away so he will not see the examiner place two "X's" about 24 to 30 inches apart on the chalkboard. The examiner says to the child, "Draw a line from one "X" to the other." Then the examiner places two "X's" on the chalkboard in such a manner that the child must extend his hand in order to reach them. The examiner says, "Take a piece of chalk in each hand and draw two straight lines from the "X's" to the bottom of the chalkboard at the same time."

Circle: If the circle is drawn in proper size, direction, position and shape (one added instruction is allowed to achieve size and position), the child receives a score of 4. If the child, after two or three trials, achieves a circle nearly correct in size, position, and shape with only minor errors in shape, he receives a score of 3. If the

child continues to show marked difficulty in performance although, with effort, he is able to produce an acceptable drawing or if the direction of the drawing is incorrect for the child's preferred hand, he receives a score of 2. If the child is unable to produce a circle of proper size, location, or shape, if he is unable to cross the midline and continues to avoid the problem, if he shows marked confusion in direction during the drawing, or if the drawing continues to be distorted, especially flatness on one side or on the bottom, he receives a score of 1. Double circles: If the performance is smooth and certain with no more than one additional direction to achieve size and position, the child receives a score of 4. If two or three trials are necessary to achieve the desired production or if the performance continues to be halting and stiff, the child receives a score of 3. If extreme difficulty is experienced in any part of the performance, if the direction of the drawing is incorrect, or if the performance does not become acceptable within two or three trials, the child receives a score of 2. If the child is unable to perform the task, if he cannot achieve drawings of acceptable size, shape, and position, if he attends only to one hand, or if he draws circles which are distorted (flat) toward the center, he receives a score of 1. Lateral lines: If the performance is adequate, the child receives a score of 4. If there is slight hesitancy and slight inaccuracy, the child receives

a score of 3. If there is marked hesitancy or marked inaccuracy, the child receives a score of 2. If the child cannot perform the task or if his initial attempts are by walking across or using two hands, the child receives a score of 1. Vertical lines: If the performance is adequate and both lines are straight and parallel, the child receives a score of 4. If the child performs adequately, but only after hesitation and consideration of the movements involved, the child receives a score of 3. If the lines "bow" slightly, but attention is directed to both hands, the child receives a score of 2. If the lines "bow" markedly, all attention is directed to the preferred hand, or if the child cannot perform, he receives a score of 1.

Test IX - Rhythmic Writing

The examiner places the first of eight motifs just above the child's eye level on the chalkboard and says, "Copy this design." The same procedure is followed for each of the other motifs.

Rhythm: If the performance is smooth, certain, and consistent with no more than one additional trial to achieve size and position, the child receives a score of 4. If three or four trials are necessary to achieve the desired rhythmic performance, the child receives a score of 3. If extreme difficulty is experienced in any part of the performance, the child receives a score of 2. If the child is unable to perform the task, he receives a score of 1.

Reproduction: If the performance approximates the same size and letter constancy of the motif presented, the child receives a score of 4. If the performance shows decided tendency to make motifs larger or smaller than the sample motif, the child receives a score of 3. If the performance reveals reversals and omissions of components in the motifs, the child receives a score of 2. If the child is unable to perform the task, he receives a score of 1. Orientation: If the performance is adequate in terms of direction and position, and follows a straight line course from one side of the body to the other, the child receives a score of 4. If the performance is slightly slanted as the motifs are executed (either up or down), the child receives a score of 3. If the performance demonstrates that the child is incapable of reproducing the motifs on an approximately horizontal line, he receives a score of 2. If the child is incapable of performing the task, he receives a score of 1.

Test X - Ocular Pursuits

The examiner holds a pencil with the eraser pointing towards the child's face, about 18 to 24 inches away. He says, "Now watch the eraser wherever it goes." The examiner moves the pencil along the arc of a circle with a radius of about 18 or 20 inches, having its center at a point between the child's eyes. He moves the pencil approximately 18 inches to the right and then back. Then approximately 18 inches to the left and back. He then moves it up and down

for approximately 18 inches, and then in each of the two diagonals (upper left, lower right and upper right, lower left). The examiner then covers the child's right eye with a piece of cardboard and repeats the procedure. The examiner then covers the child's left eye with the cardboard and repeats the procedure. The examiner then removes the cover and says, "Look at me." Then holding the pencil directly in front of the child and at the eye level of the child says, "Now look at the eraser." The examiner then moves the eraser toward the child's nose.

Tasks 1, 2, and 3: If the eyes move smoothly, evenly, and follow the movements, the child receives a score of 4. If the eyes move basically smoothly, with only slight jerkiness or hesitation, the child receives a score of 3. If the movements are uneven or jerky, the child receives a score of 2. If the child is basically unable to follow the target, loses the target, cannot follow the target without moving his head, or if parallelism between the two eyes is not established, the child receives a score of 1. Task 4: If there is smooth, even movement, the child receives a score of 4. If the movement is basically smooth, with only slight delay or inaccuracy, the child receives a score of 3. If the movement is jerky and unsure or if grasp and release are slow or inaccurate, the child receives a score of 2. If the eyes break apart or do not converge, the child receives a score of 1.

Test XI - Visual Achievement Forms

The examiner gives the child a pencil and piece of blank paper. The examiner presents design number 1 and says, "Copy this." The examiner repeats the procedure for all seven designs.

Form: If the performance is adequate throughout, the child receives a score of 4. If there are minor distortions, particularly in the diamonds, the child receives a score of 3. If there is any segmenting in any of the drawings, the child receives a score of 2. If there are "dog ears" on the diamonds, gross segmenting, or if the child cannot produce a recognizable form in one or more of the drawings, he receives a score of 1. Organization: If the drawings are organized from left to right or top to bottom and the size is adequate, the child receives a score of 4. If other organization is complete or if more than four of the forms are organized on the page, the child receives a score of 3. If the size is markedly too small or too large or if less than five of the drawings are organized on the page, the child receives a score of 2. If no organization is apparent in the drawings, the child receives a score of 1.

APPENDIX D

PROGRESS CHART FOR EXPERIMENTAL SUBJECTS

Name_____ Age_____

Balance Board	5"	4"	3"		
Date Achieved					
Walking Board	Forward	Back.	Side.	1/2 Turn	Bal.
Date Achieved					
Marsden Ball	1 Hand	Altnt.	Bottom	Bat	
Date Achieved					
Chalkboard	V. Line	H. Line	1 Dot	Dots	Circle
Date Achieved					
Angels	A's & L's	1 Limb	Both R&L	Oppos.	
Date Achieved					
Pegboard	Square	Tri.	Rect.	Complex	
Date Achieved					

APPENDIX E

TRAINING ACTIVITIES FOR EXPERIMENTAL SUBJECTS

Angels-in-the-Snow

The child lies flat on his back on the floor with his feet together and his arms to his sides. First he is asked to move his arms until his hands meet above his head, keeping his elbows straight. He is encouraged to push his heels against the floor as he moves his legs and to press his hands against the floor as he moves his arms. He is encouraged to click his heels as his feet come together and to slap his sides with his hands as he brings them back down. Initially the child can be helped by moving an arm or leg for him until he can complete the movement on his own. Once the child has learned these movements, the trainer may have him combine leg and arm movements. His heels should click at the same time that his hands slap his legs. The next step is to have the child move only his right leg, only his left leg, etc. If the child has difficulty holding the other limb still, the trainer may hold the other limb for him, until he can accomplish the task by himself. The child may have aid in identification of a limb by touch until he is able to identify the part by pointing alone. After the child has mastered single limb control, he is asked to move his right leg and right arm

together, and then his left leg and left arm. When this is accomplished, cross-lateral movements are requested, such as left leg-right arm, and vice versa. When the aforementioned tasks have been mastered, the child is asked to do the tasks in rhythm to counting. When this is accomplished, the child is asked to repeat the same tasks while on his stomach with a pillow placed under his abdomen.

Walking Board

The child is first asked to start at one end of the board and walk slowly to the other end. Initially the trainer may aid the child by holding his hand. It is essential that the child walk slowly and that each foot be placed squarely on the board so that toe and heel make contact on each step. After the child has learned to walk the board forward, he learns to walk it backwards. Initially the child is allowed to look back to see where he is going but must learn to master the task without looking. Next the child learns to walk the board sideways. He begins by standing on the left-hand end of the board and beginning with his preferred foot, steps out, shifts his weight, and moves his other foot until his feet are together. This sequence is repeated until he has crossed the board. Then he returns to the starting point with the sequence of actions reversed, leading with the other (non-preferred) foot. When the child has accomplished these three tasks and balance is maintained, he is taught to turn on the board.

He is asked to walk forward across the board, and without stepping off, turn and walk sideways back. When he has accomplished this half turn, he is asked to walk forward across and return walking forward, making a full turn. Finally he is asked to walk backward across the board, make a full turn, and to return walking backwards.

Balance Boards

The child starts with the five-inch balance board and when he can balance without difficulty, he practices balancing on the four-inch board. When this is mastered, he practices balancing on the three-inch board. When the child has accomplished this task, he is asked to bounce a ball while balancing. The child begins with a large (basketball) ball and decreases to a small (tennis) ball. He bounces the ball with both hands, then only the preferred hand, and then the other hand. While balancing on the board, the child is then requested to play catch with the trainer. When this is accomplished, the child is asked to perform his Marsden ball tasks while maintaining his balance on the three-inch board.

Drawing Games

First the child is asked to trace with his fingers a drawing of a circle that the trainer has put on the chalkboard. When this is easily performed, the child is asked to draw a circle. The trainer may guide his hand to aid in closure. The circle must be drawn across the midline and

starting at the top, proceed counterclockwise if his right hand is preferred, or clockwise if the left hand is preferred. Next the child must be able to reproduce a straight vertical line, beginning by copying a line drawn by the trainer. When the vertical line can be drawn without aid, the child may progress to horizontal lines in the same manner as the vertical. The horizontal line must cross the midline of the body, be drawn with one hand, and with the feet remaining in a fixed position. Next the diagonal line is introduced by asking the child to copy a triangle and then a diamond. When the straight line tasks have been mastered, the child is asked to participate in a game of following dots. The trainer places two dots on the chalkboard and the child draws a straight line from one to the other. When this is accomplished without overshooting the dots, more dots are added, one at a time at random. The child is asked to move from one dot to the next without lifting his chalk. When the child has successfully achieved this, the dots may be placed to make meaningful designs.

Pegboards

First the child is asked to copy a straight vertical row of pegs, then a straight horizontal row, and then a diagonal row. Next the trainer outlines a simple figure such as a square, triangle, etc. and the child is asked to make one like it on his board. He may look at the form during the entire time that he is constructing his copy.

Initially the child may be aided by a cardboard template in the shape of the form presented as a guide. When the child can construct simple forms, more complex forms such as a house or boat are introduced. Also specific color patterns are introduced on the simple forms and later the more complex forms.

Marsden Ball

The child stands arm's length from the ball with the pivot line of the string directly in front of him. The trainer pulls the ball to one side and releases it, letting it swing across in front of the child. The child is asked to reach out and touch the ball as it passes in front of him. He is not allowed to obstruct the path of the ball. At first the child must begin by holding his hand by his shoulder and thrust out to touch the ball, then he begins at a point by his eyes, and then from the hip. He must thrust in one steady movement and keep his head still, facing forward, but follow the ball with his eyes. This task begins with a small arc and increases to a larger arc of swing. Once he can do this, the child is instructed to thrust only when the trainer says, "Now." When the child has mastered this task as the ball swings laterally, he is asked to perform the same tasks as the ball swings forward and back. On this task the child touches the ball from underneath. When this task has been accomplished, the child may be given a short bat with which to bunt the ball.

For this task, the child is asked to reach out and meet the ball, rather than waiting for the ball to hit the bat. When all Marsden ball tasks have been mastered, they may be attempted from the balance boards.

APPENDIX F

ACTIVITY RECORD FOR CONTROL SUBJECTS

Name_____ Age_____

DATE	ACTIVITY Phys.	Quiet	DESCRIPTION OF ACTIVITY